REMARKS

Applicants respectfully request reconsideration of this application as amended. Claims 1-42 remain in this application. Claims 1 and 10 have been amended. No new claims have been added.

Rejections under 35 U.S.C. § 103(a)

The Office Action rejected claims 1-3, 5, and 8 under 35 U.S.C. § 103(a) as being unpatentable over Golmie et al., "A Differentiated Optical Services Model for WDM Networks" (hereinafter "Golmie") in view of Sengupta et al., "Analysis of Enhanced OSPF for Routing Lights in Optical Mesh Networks" (hereinafter "Sengupta").

With respect to claim 1, Applicants respectfully submit that the combination of Golmie and Sengupta does not teach what Applicants are claiming. Golmie discloses "a QoS service model in the optical domain ... based on a set of optical parameters that captures the quality and reliability of the optical lightpath." (Golmie, Abstract.) An optical lightpath being "an optical communication channel, traversing one or more optical links, between a source-destination pair." (Golmie, Page 69, Left column.) An optical resource allocater handles the dynamic provisioning of lightpaths..." (Golmie, Page 72, Left column.) Golmie does not describe what type of databases are used, the content of these databases, or where a network topology database may be stored.

Sengupta discloses "enhancements to the OSPF protocol for routing and topology discovery in optical mesh networks." (Sengupta, Abstract.) "OSPF allows hierarchical routing, whereby a large network may be treated as a collection of smaller areas with limited information exchange between areas." (Sengupta, Page 2865, Right column.) "[R]oute computation is triggered by path setup requests only... [with the] need to run the path computation algorithm at an ingress OXC only when the lightpath request arrives." (Sengupta, Page 2866, Right column.) It is Applicants' understanding that in this system

each node of an area has the same database that contains information about the all of the nodes of entire area and is not specific to just that particular node; route calculation is only responsive a lightpath request and no forwarding table is computed. (Sengupta, Page 2866, Right column, bullet 4.)

Thus, the combination of Golmie and Sengupta is an OSPF based system wherein each node of an area utilizes the same database about all of the nodes of the area. The QoS service model of Golmie would provide optical parameters for classification to be used in the database. The combination does not teach each "access node" having a "network topology database" that is "specific" to that access node that is based on a set of one or more connectivity constraints, where "network topology is the paths and wavelengths of all possible communication paths from that access node to other nodes"; much less the limitation of "the wavelengths for each path are the set of wavelengths of each link of that path that are available for establishing lightpaths on that path." Therefore, the combination of Golmie and Sengupta does not teach what Applicants are claiming in claim 1.

Claims 2-9 are dependent upon claim 1 and are allowable for at least the same reason.

The Office Action rejected claims 10-11 and 14 under 35 U.S.C. § 103(a) as being unpatentable over Sengupta in view of Shami et al., "Performance Evaluation of Two GMPLS-Based Distributed Control and Management Protocols for Dynamic Lightpath Provisioning in Future IP Networks" (hereinafter "Shami").

With respect to claim 10, the combination of Sengupta and Shami does not teach what Applicants are claiming. Specifically, the combination does not at least teach "a wavelength division multiplexing optical network including a plurality of access nodes each including, for each link connected to the access node, a link channel set representing at least certain wavelengths on that link available for establishing a lightpath, wherein a

lightpath is a wavelength and a path, wherein the path of a given lightpath is a series of two or more nodes and links interconnecting them through which traffic is carried by the wavelength of that lightpath, wherein said series of nodes respectively starts and ends with a source node and a destination node, and a database representing conversion free connectivity from the access node to others of said access nodes using the wavelengths in said link channel sets, wherein said conversion free connectivity includes the paths and wavelengths of possible lightpaths having the access node as the source node and others of the access nodes as the destination node."

Shami discloses that "none of the OXCs has wavelength conversion capability...a lightpath, that uses the same wavelength on all the links along the entire route from source-to-destination must be set up." (Shami, Page 2290, Left column.) Shami discloses two approaches to routing. In the first approach, "each node in the network is required to maintain a routing table that contains an ordered list of a number of fixed shortest routes to each destination node...[and] maintain[s] information regarding the status of wavelength usage on its outgoing links." (Shami, Page 2290, Right column.) In this approach, "[w]hen a connection request arrives, the source node attempts to establish the connection on each of the routes maintained in the routing table in sequence, until a route with a valid wavelength assignment (first-fit algorithm) is found." (Shami, Page 2290, Right column.) Essentially, a message must traverse the entire route trying to find a wavelength (of the free wavelengths at the node) that will work. (Shami, Page 2291, Left column.) If two of such messages fail, then the connection is blocked. (Shami, Page 2291, Left column.) In the second approach, Shami discloses a modified OSPF setup. In this approach "each node in the network must maintain complete network state information, including the network topology and wavelength usage on each link." (Shami, Page 2291, Left column.) This network state information is identical for all nodes. (Shami, Page 2291, Right column.)

The combination of Sengupta and Shami could therefore teach one of two approaches. In the first approach, each node of an area maintains two things: 1) a routing table that contains "an ordered list of a number of fixed shortest routes"; and 2) information regarding that status of wavelength usage on its outgoing links (not information regarding lambdas on other links on those routes). This is clear from how Shami describes the process to setup a lightpath (a message must be sent to all nodes of the route to identify a final set of free wavelengths representing the intersection of the free wavelengths of each of the links on the route; the last hop router picks a free wavelength from the final set). This approach does not describe a "database representing conversion free connectivity from the access node to others of said access nodes using the wavelengths in said link channel sets, <u>wherein said conversion free connectivity includes the paths and wavelengths of possible lightpaths</u> having the access node as the source node and others of the access nodes as the destination node."

In the second approach, each node maintains complete network state information for its area. Thus, the combination of Shami and Sengupta is an OSPF based system wherein each node of an area utilizes the <u>same</u> database about all of the nodes of the area. The combination does not teach <u>each</u> "access node" having a database representing conversion free connectivity that is <u>specific to that access node</u> that is based on a set of one or more connectivity constraints, where conversion free connectivity includes the paths and wavelengths of possible lightpaths from that access node to other nodes"; much less the limitation of "the wavelengths for each path are the set of wavelengths of each link of that path that are available for establishing lightpaths on that path." Therefore, the combination of Shami and Sengupta does not teach what Applicants are claiming in claim 10.

Applicants respectfully submit that the combination of Shami and Sengupta does not teach what Applicants are claiming in claim 10. Claims 11-15 are dependent upon claim 10 and are therefore allowable for at least the same reason.

The Office Action rejected claims 16-19, 21-22, 24-26, 28, 30-34, and 36 under 35 U.S.C. § 103(a) as being unpatentable over Sengupta in view of Shami. With respect to claim 16, the combination of Sengupta and Shami does not teach what Applicants are claiming. Specifically, "each of said plurality of access nodes, maintaining a topology based on conversion free connectivity to others of said plurality of said access nodes; and responsive to a request for a communication path received by any one of said plurality of access nodes, that access node, selecting both a path through a set of one or more links of said optical network and a single wavelength available on everyone of said set of links based on said topology maintained in that access node."

In the first approach taught by the combination of Sengupta and Shami, the "last hop-router (destination)" of a route picks one free wavelength from the final set if the final set is not empty. This is necessary because the routing table stored does not have sufficient information to allow for the source node to pick the path and wavelength. This does not teach or suggest "<u>responsive to a request</u> for a communication path received by any one of said plurality of access nodes, <u>that access node</u>, selecting both a path through a set of one or more links of said optical network and a single wavelength available on everyone of said set of links based on said topology maintained in that access node"; much less "maintaining" its own "topology based on conversion free connectivity" (thus it is specific to that access node) "to others of said plurality of network nodes."

In the second approach taught by the combination of Sengupta and Shami, a full physical topology is stored in every node of an area, and this physical topology is the same for every node. This does not teach of suggest the claim limitation of each access

node "maintaining" its own "topology based on conversion free connectivity" (thus it is specific to that access node) "to others of said plurality of network nodes."

Claims 17-24 are dependent upon claim 16 and are allowable for at least the same rationale.

With respect to claim 25, the combination of Sengupta and Shami does not teach what Applicants are claiming.

In the first approach taught by the combination of Sengupta and Shami, the "last hop-router (destination)" of a route picks one free wavelength from the final set if the final set is not empty. This is necessary because the routing table stored does not have sufficient information to allow for the source node to pick the path and wavelength. This does not teach or suggest "a module to, <u>responsive to requests</u> for communication paths received by said access node, select from unallocated ones of said available paths and <u>the common set of wavelengths thereon a selected path and wavelength</u>"; much less "a database to store a representation of available paths from the access node to others of said access nodes using the wavelengths in said link state database, wherein a path is a series of two or more nodes connected by links on which a common set of one or more wavelengths is available for establishing one or more lightpaths."

In the second approach taught by the combination of Sengupta and Shami, a full physical topology is stored in every node of an area, and this physical topology is the same for every node. This does not teach of suggest the claim limitation of each access node having "a database to store <u>a representation of available paths</u> from the access node to others of said access nodes <u>using the wavelengths in said link state database</u>, wherein a path is a series of two or more nodes connected by links on which <u>a common set of one or more wavelengths is available</u> for establishing one or more lightpaths."

Claims 26-30 are dependent upon claim 25 and are allowable for at least the same rationale.

With respect to claim 31, the combination of Sengupta and Shami does not teach what Applicants are claiming.

In the first approach taught by the combination of Sengupta and Shami, the "last hop-router (destination)" of a route picks one free wavelength from the final set if the final set is not empty. This is necessary because the routing table stored does not have sufficient information to allow for the source node to pick the path and wavelength. This does not teach or suggest "selecting a path and a wavelength on said path using a database that is stored in said access node and that stores a representation of available paths from the access node to others of said access nodes in said optical network, wherein each path is a series of two or more nodes connected by links on which a common set of one or more wavelengths is available for establishing one or more lightpaths; and said access node communicating with those of the access nodes on the selected path to cause allocation of the selected wavelength on the selected path."

In the second approach taught by the combination of Sengupta and Shami, a full physical topology is stored in every node of an area, and this physical topology is the same for every node. This does not teach of suggest the claim limitation of each access node having "selecting a path and a wavelength on said path using a database that is stored in said access node and that stores a representation of available paths from the access node to others of said access nodes in said optical network, wherein each path is a series of two or more nodes connected by links on which a common set of one or more wavelengths is available for establishing one or more lightpaths."

Claims 32-36 are dependent upon claim 31 and are allowable for at least the same rationale.

The Office Action rejected claims 34-40 and 42 under 35 U.S.C. § 103(a) as being unpatentable over Sengupta and Shami as applied to claims 16-19, 21-22, 24-26,

28, 30-34, and 36 above, and further in view of Freeman, "Telecommunication System Engineering" (hereinafter "Freeman"). Freeman discloses to store method steps as program memory for providing instructions to a controller or computer.

With respect to claim 37, in the first approach taught by the combination of Sengupta and Shami, the "last hop-router (destination)" of a route picks one free wavelength from the final set if the final set is not empty. This is necessary because the routing table stored does not have sufficient information to allow for the source node to pick the path and wavelength. This does not teach or suggest "responsive to receiving, at an access node of an wave division multiplexing optical network, demand criteria representing a request for a communication path, selecting a path and a wavelength on said path using a database that is stored in said access node and that stores a representation of available paths from the access node to others of said access nodes in said optical network, wherein each path is a series of two or more nodes connected by links on which a common set of one or more wavelengths is available for establishing one or more lightpaths."

In the second approach taught by the combination of Sengupta and Shami, a full physical topology is stored in every node of an area, and this physical topology is the same for every node. This does not teach of suggest the claim limitation of "responsive to receiving, at an access node of an wave division multiplexing optical network, demand criteria representing a request for a communication path, selecting a path and a wavelength on said path using a database that is stored in said access node and that stores a representation of available paths from the access node to others of said access nodes in said optical network, wherein each path is a series of two or more nodes connected by links on which a common set of one or more wavelengths is available for establishing one or more lightpaths."

Claims 38-42 are dependent upon claim 37 and are allowable for at least the same rationale.

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Respectfully submitted,

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